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**Risk and Technology Review – Phase II
Advanced Notice of Proposed Rulemaking
Source Category Data Summary**

NITRILE BUTADIENE RUBBER PRODUCTION

March 2007

1.0 INTRODUCTION

Section 112(f)(2) of the Clean Air Act (CAA) directs EPA to assess the risk remaining (residual risk) after the application of control technology standards under section 112(d) (MACT). EPA is to promulgate more stringent standards for a category or subcategory of sources subject to MACT standards under section 112(d) if promulgation of such standards is necessary to protect public health with an ample margin of safety or to prevent (taking into consideration various factors) adverse environmental effects.

In an effort to streamline the process of making residual risk decisions for the large number of MACT source categories for which residual risk rules have not yet been developed, EPA plans to address residual risk and perform a technology review for several source categories in one combined effort. The first part of this approach is to compile and review (and update with facility-specific data collected by EPA in some cases) readily available source category emissions data from the 2002 NEI, and to identify hazardous air pollutants (HAP) expected to contribute the most to risks from each source category as well as to identify apparent anomalies in the data sets. This information will then be made available for public comment through an Advanced Notice of Proposed Rulemaking (ANPRM).

This document provides a summary of the available data for the Nitrile Butadiene Rubber Production source category. Section 2 of this document provides an introduction to this source category and a brief summary of the available emissions data. Section 3 identifies key HAP that may impact risk, as well as aspects of the data that may impact risk estimates. Section 4 includes a bulleted list of data anomalies, included to facilitate public comment.

A separate file available for download contains the detailed emissions and emissions release characteristic data for this source category. EPA is requesting comment on these data, which include emission rates, stack parameters, and source location information. Additions, deletions, and corrections to the data will be made based on feedback and comments from stakeholders and the public. Specific instructions on how to download and submit corrections to these data can be found in the text of the ANPRM, as well as within a “readme” file available on the website from which you obtained this summary report.

2.0 SOURCE CATEGORY AND EMISSIONS DATA

Group I polymers and resins includes nine source categories of elastomer (i.e., synthetic rubber) production sources. These source categories are Butyl Rubber Production, Epichlorohydrin Elastomers Production, Ethylene-Propylene Elastomers Production, HypalonTM Production, Neoprene Production, Nitrile Butadiene Rubber Production, Polybutadiene Rubber Production, Polysulfide Rubber Production, and Styrene-Butadiene Rubber and Latex Production. An elastomer is a synthetic polymeric material that can stretch up to twice its original length and

then return rapidly to approximately its original length when released. Elastomers have long, flexible, chainlike molecules that are able to undergo rapid rotation (i.e., flex) as a result of thermal agitation. Elastomers are produced via a polymerization process, in which monomers undergo intermolecular chemical bonds to form an insoluble, three-dimensional network (i.e., a polymer). Generally, the production of elastomers entails four processes: (1) raw material storage (i.e. solvents) and refining; (2) polymer formation in a reactor (either via the solution process, where monomers are dissolved in an organic solvent, or the emulsion process, where monomers are dispersed in water using a soap solution); (3) stripping and material recovery; and (4) finishing (i.e., blending, aging, coagulation, washing, and drying processes). The elastomers produced by the nine source categories listed above are used in products such as tires, hoses, belts, footwear, adhesives, caulks, wire insulation, seals, floor tiles, and latexes.

Nitrile butadiene rubber (NBR) is a copolymer of 1,3-butadiene and acrylonitrile, and the NBR production source category includes any facility that polymerizes 1,3-butadiene and acrylonitrile. The emulsion, bulk, or solvent processes can be used to produce NBR. Either a continuous or a batch process can be used in production of NBR. In the manufacturing of NBR, the initial polymerization and stripping steps are similar to those used in the production of latex, except that polymerization of latex is typically a higher conversion reaction. The major difference between these two production processes is that in the production of nitrile butadiene rubber, the polymer is coagulated and dried, while in the production of latex, the stripped latex is simply blended with other specialty ingredients to produce the final nitrile butadiene latex product. The drying and finishing steps that make up the back-end processes for nitrile butadiene rubber are significant sources of HAP emissions. Other sources of HAP emissions include raw material storage vessels, front-end process vents, wastewater operations, and equipment leaks. The process "front-end" includes pre-polymerization, reaction, stripping, and material recovery operations; and the process "back-end" includes all operations after stripping (predominately drying and finishing). Depending on its specific composition, NBR can be resistant to oil and chemicals, a property that facilitates its use in disposable gloves, hoses, seals, and a variety of automotive applications.

From information gathered during the MACT development and from more recent contacts with the industry, it is estimated that there are four major source facilities and one area source facility with processes belonging in the Nitrile Butadiene Rubber Production source category. EPA identified each of these five facilities in Version 1.0 of the 2002 NEI (February 2006). However, in the NEI, two facilities are identified as major sources and three are identified as area sources. The MACT standard for this source category only covers major sources. However, there is uncertainty associated with these major/area classifications. Without verification of the area source status of individual facilities, EPA will likely consider all facilities in the NEI to be major sources in future risk assessments.

Based on existing NEI data on MACT codes, SCC codes, and pollutants emitted, EPA identified the processes at each facility believed to be in the Nitrile Butadiene Rubber Production source category. For three facilities (Zeon in Louisville, Kentucky; WR Grace in Owensboro, Kentucky; and DowReichhold in Delaware), data collected directly from the industry in 2004 as part of preliminary residual risk efforts was available, and the NEI information for the Nitrile Butadiene Rubber Production processes at these facilities was replaced with this industry data. Data was not collected from industry for the remaining two facilities (DSM Copolymers, Baton Rouge and DowReichhold in Georgia), so the data in the ANRPM data set for these facilities is from Version 1.0 of the 2002 NEI (February 2006). Together, these data comprise the data set that will be used for the risk characterization effort for this source category (after consideration of public comments as a result of the ANPRM).

Table 2-1 summarizes the emissions for the Nitrile Butadiene Rubber Production source category data set. Styrene accounts for about 39 percent of the total HAP emissions and is emitted by three of the five facilities (60 percent). Most of the remaining HAP emissions for this category are 1,3-butadiene (24 percent of the total) and acrylonitrile (32 percent of the total), reported as emissions by four and five facilities, respectively. No persistent or bioaccumulative HAP (PB HAP) were reported by the facilities in the ANPRM data set.

Table 2-1. Summary of Emissions from the Nitrile Butadiene Rubber Production Source Category

HAP	Emissions (tpy)	Number of Facilities Reporting HAP (5 facilities in ANPRM data set)	Prioritized Inhalation Dose-Response Value Identified by OAQPS ^a			PB-HAP?
			Unit Risk Estimate for Cancer?	Reference Concentration for Noncancer?	Health Benchmark Values for Acute Noncancer?	
Styrene	35	3		U	U	
Acrylonitrile	29	5	U	U	U	
1,3-Butadiene	22	4	U	U	U	
Ethyl Acrylate	3	1			U	
Carbon Disulfide	0.4	1		U	U	
Methanol	0.1	1		U	U	
Acrylic Acid	0.1	1		U	U	

^a Specific dose-response values for each chemical are identified on EPA's Technology Transfer Network website for air toxics at: <http://www.epa.gov/ttn/atw/toxsource/summary.html>.

3.0 KEY HAP AND DATA SET ANOMALIES

This section identifies the key HAP for this source category and uncertainties or anomalies associated with the data based on a preliminary review of the NEI. To help focus efforts to review inventory data, Table 3-1 lists key carcinogenic HAP and key non-carcinogenic HAP emitted by this source category in order of their most likely importance for this source category. HAP may be listed as both carcinogenic and non-carcinogenic if it causes both cancer and adverse health effects other than cancer. Table 3-2 summarizes the data anomalies and uncertainties.

Table 3-1. Key HAP

Carcinogenic HAP	acrylonitrile, 1,3-butadiene
Non-carcinogenic HAP	1,3-butadiene

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Table 3-2. Uncertainties in the Summary of ANPRM Data Set for Nitrile Butadiene Rubber Production and Their Potential Impacts on Risk Estimates

Parameter	Assumption	Discussion of Uncertainties or Anomalies	Potential Impact on Risk Estimates
Source Category Representation			
Facilities included	Facilities in the ANPRM data set are representative of entire source category.	The APRM data set includes data for the facilities expected to be in this source category.	Minimal bias.
Emissions and Release Characterization			
HAP emitted	The ANPRM data set is complete and correct.	1,3-butadiene, which is necessary to make nitrile butadiene rubber and should be emitted, is not reported from one facility.	Could underestimate risks.
Emission levels	The emission levels in the ANPRM data set are actual emission levels that represent normal operating conditions while in compliance with the applicable MACT standard.	The actual emission levels are likely lower than the “allowable” emission levels that are permissible by the standard.	Could underestimate potential risk levels.
Stack release characteristics	The ANPRM data set is either correct or has reasonable default parameters from the NEI where data were not provided by the State agencies.	The quality of stack release characteristics for individual facilities varies as some facilities have stack-specific parameters, while others have default parameters. The stack characteristics for the Zeon Louisville, WR Grace Owensboro, and Dow Reichold Delaware facilities were supplied by the facility. For the other facilities, about one-half of the stack parameters are based on defaults.	Could underestimate or overestimate risks.

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Table 3-2. Uncertainties in the Summary of ANPRM Data Set for Nitrile Butadiene Rubber Production and Their Potential Impacts on Risk Estimates

Parameter	Assumption	Discussion of Uncertainties or Anomalies	Potential Impact on Risk Estimates
Emission source coordinates	The ANPRM data set contains accurate coordinates for each emission point.	<p>The coordinates for the Zeon Louisville, WR Grace Owensboro, and Dow Reichold Delaware facilities were provided by the facilities.</p> <p>For the other facilities, 74 percent of the records have coordinates that were defaulted, and these defaults were based on street addresses. In addition, there may be other errors in the coordinates that result in the emission sources not being properly located on plant property.</p>	Could underestimate or overestimate risks.

4.0 DATA ANOMALIES FOR COMMENT

- 1,3-butadiene, which is essential to make nitrile butadiene rubber and is expected to be emitted from every facility, was not reported to be emitted by one facility. In the absence of additional data, EPA will extrapolate the 1,3-butadiene emissions from the other facilities to this facility.
- As noted in Section 2, there is uncertainty in the identification of sources as major or area in the NEI. We are specifically requesting that you review the area/major identification in the data set and submit corrections as necessary.
- As noted in section 2, the EPA removed the records for the Zeon Louisville, WR Grace, and Dow Reichold, Delaware facilities from Version 1.0 of the 2002 NEI (February 2006) that were believed to represent the Nitrile Butadiene Rubber production processes that are subject to the Polymers and Resins I MACT and replaced them with more recent data obtained directly from the industry. While the uncertainty in the new data is relatively low, there is uncertainty whether the records that were removed were all the specific ones associated with Nitrile Butadiene Rubber production. Are there additional records remaining in the NEI for this location (that are classified by another MACT code) that represent Nitrile Butadiene Rubber production and should be removed? Does it appear that EPA removed and replaced records for some processes that are not Nitrile Butadiene Rubber processes?
- EPA's process to determine nitrile butadiene rubber production units at the other facilities may have included process units that are not in this source category. Are you aware of any process units in this data set that are not nitrile butadiene rubber production units? Are you aware of nitrile butadiene production units that are not represented in the data set?
- Coordinates in the NEI are checked to ensure that they are generally correct (e.g., in the correct county). However, there can still be errors in the coordinates that result in the emission sources not being properly located on plant property. We are asking for public reviewers to carefully review the coordinates for all facilities in this data set and submit corrections where necessary.